OBLIQUE SHOCK WAVES IS DUSTY GAS SUSPENSIONS

MARTSIANO,Y.;BEN-DOR,G.;IGRA,O.

The conservation equation governing the flow developed when a supersonic steady dusty gas suspension passes through a straight oblique shock wave were developed using the following assumptions: 1) the gas behaves as an ideal gas, 2) the solid particles are rigid, inert and identical spheres, uniformly distributed in the gaseous phase, 3) the volume occupied by the solid phase is negligibly small, 4) aside from momentum and energy interactions between the two phases, the gaseous phase is invicid and non-conductive, 5) the dynamic viscosity, the thermal conductivity and the specific heat capacities of the gaseous phase depend solely on its temperature, 6) due the their size the solid particles cross the shock front unaffected, 7) the solid particles are too large not to experience a Bromnian motion, 8) the temperature within the solid particles is uniform, 9) the weight and the buoyancy forces experienced by the solid particles are negligibly small in comparison with the drag forces acting on them, 10) the heat capacity of the solid particles is neglected.

A numerical code capable of solving the governing equations was developed and used to obtain solutions for the considered flow field for a variety of different initial conditions. In addition, the dependence of the post-shock suspension properties on the physical properties of the particles, namely; its diameter, its heat capacity, its material density and its loading ration, was investigated.

In addition, it was shown that it is impossible to shape a wedge in such a way that it will generate a straight oblique shock wave in a supersonic flow of a dusty gas suspension.